



Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

AFRL ON AWARD-WINNING TEAM



The AWS team members are (pictured left to right): Dr. Shawn Woodson, Naval Air Systems Center; Dr. J. Victor Lebacqz, NASA Associate Administrator for Aeronautics; Mr. Lawrence Ash, Office of Naval Research; Dr. Robert Hall, NASA Langley Research Center; Dr. Greg Addington, AFRL; Mr. Mark Melanson, Lockheed Martin; Mr. Frank Berrier, Boeing; Dr. Guru Guruswamy, NASA Ames Research Center; and Lt Col Scott Morton, US Air Force Academy.

AFRL, the National Aeronautics and Space Administration (NASA), the Naval Air Systems Command, and several other academic and industry partners won the Turning Goals Into Reality Award in the Partnerships for National Security category for outstanding contributions toward NASA's goal to revolutionize aviation. NASA presents this award yearly to individuals or groups nationwide who have made outstanding progress toward achieving NASA's program goals.



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Accomplishment

The team put more than 5 years' effort into development of new ways to predict and eliminate transonic aircraft susceptibility to unanticipated, uncommanded departures in roll, including abrupt asymmetric wing stall and other, less dramatic events. Engineers developed a simulation model by using data from current and historical transonic military aircraft and conducting high-speed wind tunnel tests. They used actual flight test data and first-of-a-kind, free-to-roll transonic wind tunnel tests to validate the model. Scientists can use the resulting new tool early in the design process, prior to the flight test phase of an acquisition program, to determine if an aircraft's wing design is susceptible to abrupt wing stall (AWS). The Joint Strike Fighter program has already benefited from this research.

Background

AWS occurs when an aircraft, maneuvering at low-transonic velocities (just below Mach 1), experiences a sudden, adverse rolling motion. The AWS program found that in many cases, both recent and historical, this event is caused by the sudden forward motion of normal shock waves over one wing, a phenomenon that induces a large separated flow region and proportional decrease in lift. In most cases (e.g., the Boeing-Navy F/A-18E Super Hornet), design engineers do not find an aircraft's susceptibility until the flight test, a delay that leads to more costly efforts to find a solution.

Air Vehicles
Awards and Recognition

Additional Information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (05-VA-09)